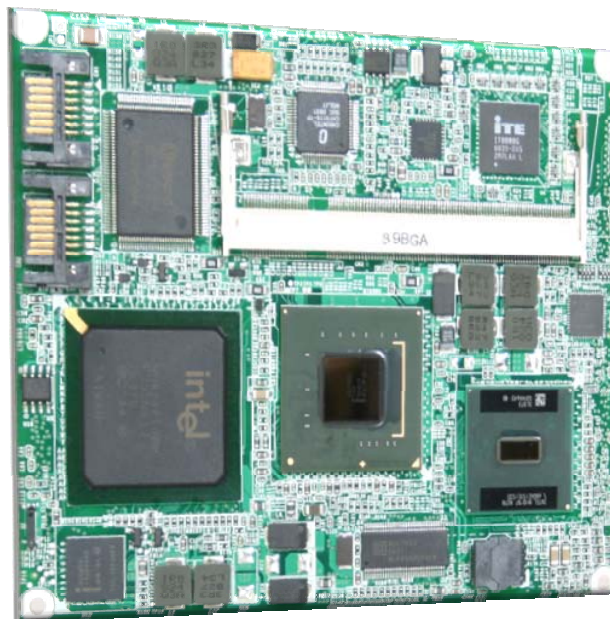


PEM-E200VLA

ETX 3.0 Module

User's Manual



Version 1.0

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How to Use This Manual

The manual describes how to configure your PEM-E200VLA to meet various operating requirements. It is divided into five chapters, with each chapter addressing a basic concept and operation of this ETX 3.0 Module.

Chapter 1 : System Overview. Presents what you have in the box and give you an overview of the product specifications and basic system architecture for this model of single board computer.

Chapter 2 : Hardware Configuration. Shows the definition and location of Jumpers and Connectors that you can easily configure your system.

Chapter 3 : System Installation. Describes how to properly mount main memory to get a safe installation and provides a programming guide of Watch Dog Timer function.

Chapter 4 : BIOS Setup Information. Specifies the meaning of each setup parameters, how to get advanced BIOS performance and update new BIOS. In addition, POST checkpoint list will give users some guidelines of trouble-shooting.

The content of this manual and EC declaration document is subject to change without prior notice. These changes will be incorporated in new editions of the document. **Portwell** may make supplement or change in the products described in this document at any time.

Updates to this manual, technical clarification, and answers to frequently asked questions will be shown on the following web site : <http://www.portwell.com.tw>

Chapter 1

System Overview

1.1 Introduction

ETX, stands for Embedded Technology eXtended, computer-on-module (COM) is a highly integrated and compact form factor (3.7 x 4.4 in.) (95 x 114 mm). New modules designed according to the ETX 3.0 specification integrate two SATA ports via two slim line connectors designed onto the top side of the CPU Module in the vicinity of X4. The module or carrier board ETX connectors do not require any changes to take advantage of the faster SATA hard drives.

The “Module board” is based on the Intel® Navy Pier platform with the ATOM® processor N270, the northbridge 945GSE and the southbridge ICH-7M, memory socket and single Ethernet controller on it. The On-The-Shelf Module board allows users to create their own Carrier board easily and quickly since most critical parts are ready on Module board. There are PCI32, USB 2.0, Serial ATA, Parallel ATA, LVDS Multi-Media ports as well as an ACPI (Advanced Configuration and Power Interface) for optimized power management. that could support variety functions depending on Carrier board design.

The Carrier board was customized design to fit in different mechanical requirements. In the meanwhile, its variety functions were also customized to meet the application. Compares to the platform that designed from nothing, ETX architecture platform only needs to develop Carrier board. Users could keep their know-how which related to their core competence in the Carrier board.

1.2 Check List

The PEM-E200VLA package should cover the following basic items

- ✓ One PEM-E200VLA module board
- ✓ One Installation Resources CD (Driver and Manual)

Note:

The package have not including screws due to Portwell will provide these into two type heat sink kit, one is passive heat sink with fin and another is heat spreader type.

If any of these items is damaged or missing, please contact your vendor and keep all packing materials for future replacement and maintenance.

1.3 Product Specification

- **Main processor**
 - Intel® Atom N270
 - FSB: 533 MHz
 - 2-Threads support
 - Hyper-Threading Technology support
- **BIOS**

Phoenix (Award) system BIOS in SPI ROM with 512KB Flash ROM with easy upgrade function ACPI, DMI, Green function and Plug and Play Compatible
- **Main Memory**

One SO-DIMM sockets support single channel DDR2 400/533 up to 2GB
- **L2 Cache Memory**

512MB Build-in processor
- **Chipset**

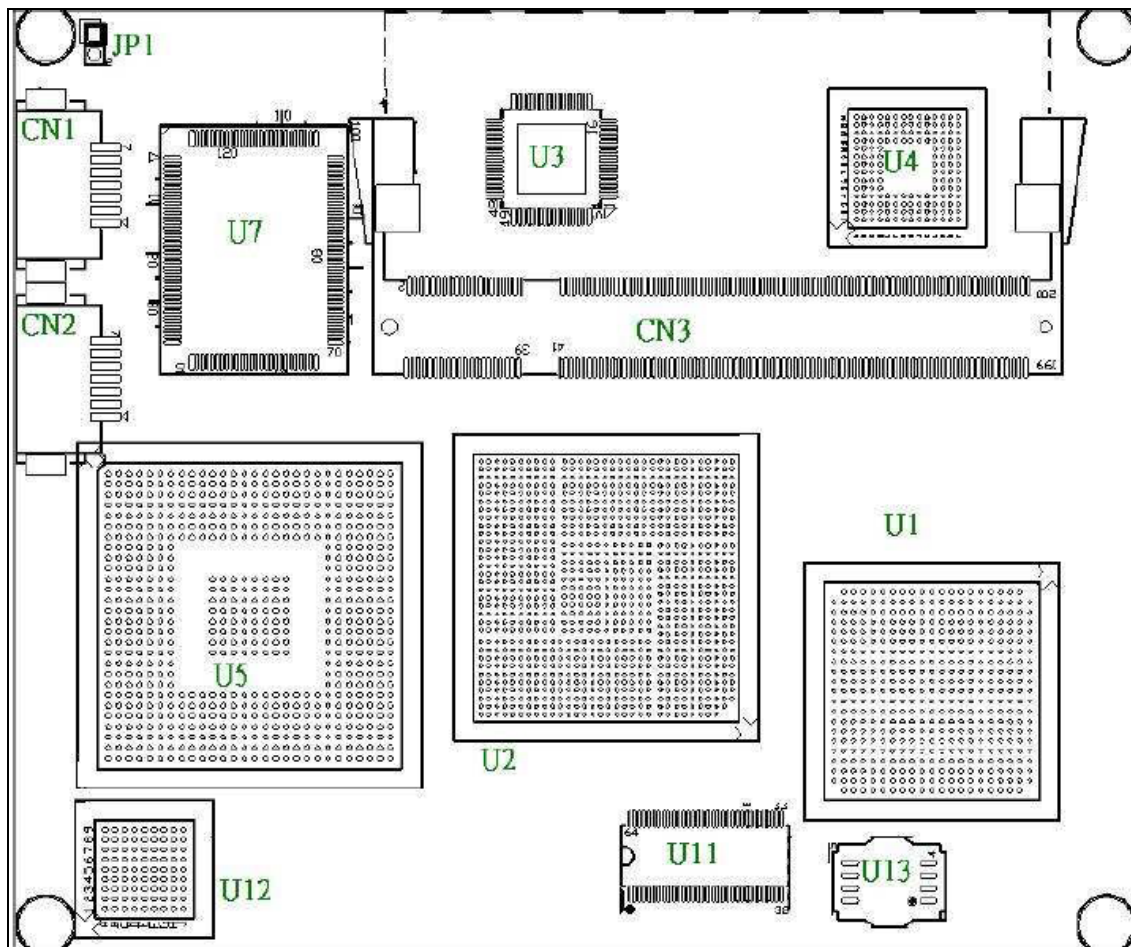
Intel 945GSE Express Chipset and ICH7M Family chipset
- **Expansion Interfaces**
 - PCI
 - Total Four PCI Master
 - LVDS
 - Supports 25 to 112MHz single channel LVDS interface @18 bpp TFT panel type supported
 - Pixel Dithering for 18-bit TFT panel to emulate 24-bpp true color displays
 - Maximum Panel size supported up to UXGA (1600 x 1200)
 - TV-out
 - Three integrated 10-bit DACs
 - NTSC/PAL
 - SDVO (Serial Digital Video Output)
 - Appropriated external SDVO components (CH7317A) to support 2nd VGA
 - VGA
 - Support max DAC frequency up to 400MHz
 - Up to QXGA support
 - Support for CRT Hot Plug
 - Ethernet
 - Realtek RTL8102E(L) 10/100M Ethernet controller is equipped
 - IDE Interface
 - Support one enhanced IDE channel with PIO mode 4 ultra DMA/33/66/100

- SATA Interface
 - ♦ Support Two SATA 300 ports on module board
- USB Interface
 - ♦ Support Four USB 2.0 ports
- **Outline Dimension (L X W)**
95mm (3.7") X 114mm (4.4")
- **Operating Temperature**
0°C ~ 60°C (32°F ~ 140°F)
- **Storage Temperature**
-20°C ~ 80°C
- **Relative Humidity**
5% ~ 90%, non-condensing
- **MTBF**
The following MTBF (Mean Time Between Failure) values were calculated using a combination of manufacturer's test data, if the data was available, and a Bellcore calculation for the remaining parts.

The Bellcore calculation used is "Method 1 Case 1". In that particular method the components are assumed to be operating at a 50 % stress level in a 40° C ambient environment and the system is assumed to have not been burned in. Manufacturer's data has been used wherever possible. The manufacturer's data, when used, is specified at 50° C, so in that sense the following results are slightly conservative. The MTBF values shown below are for a 40° C in an office or telecommunications environment. Higher temperatures and other environmental stresses (extreme altitude, vibration, salt water exposure, etc.) lower MTBF values.

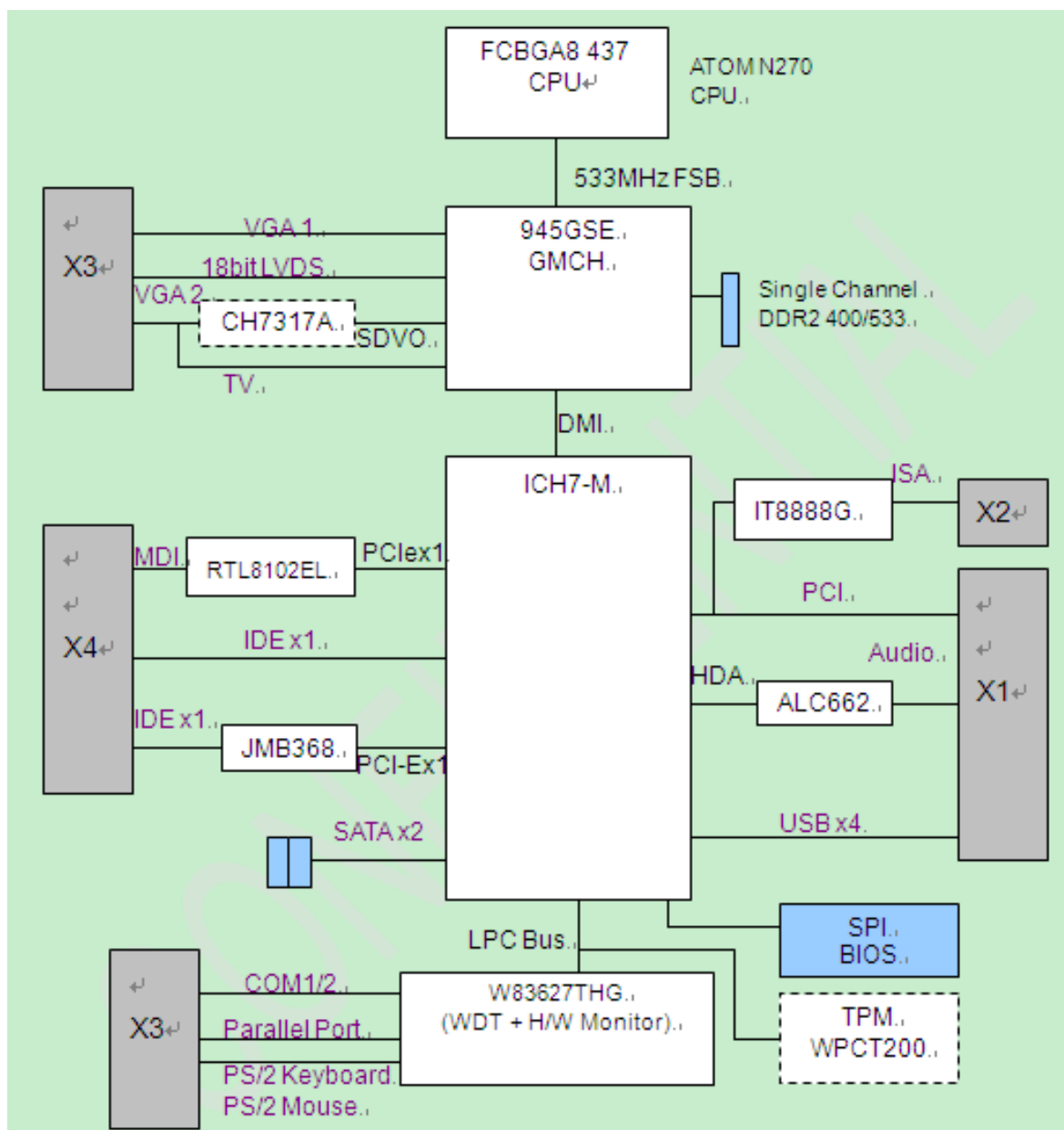
- MTBF (hours): 159983.578125

1.3.1 Mechanical Drawing



1.4 System Architecture

All of details operating relations are shown in PEM-E200 series System Block Diagram.



PEM-E200VLA Series System Block Diagram

Chapter 2

Hardware Configuration

This chapter indicates jumpers', headers' and connectors' locations. Users may find useful information related to hardware settings in this chapter. The default settings are indicated with a star sign (★).

2.1 Jumper Setting

In the following sections, **Short** means covering a jumper cap over jumper pins; **Open** or **N/C** (Not Connected) means removing a jumper cap from jumper pins. Users can refer to Figure 2-1 for the Jumper allocations.

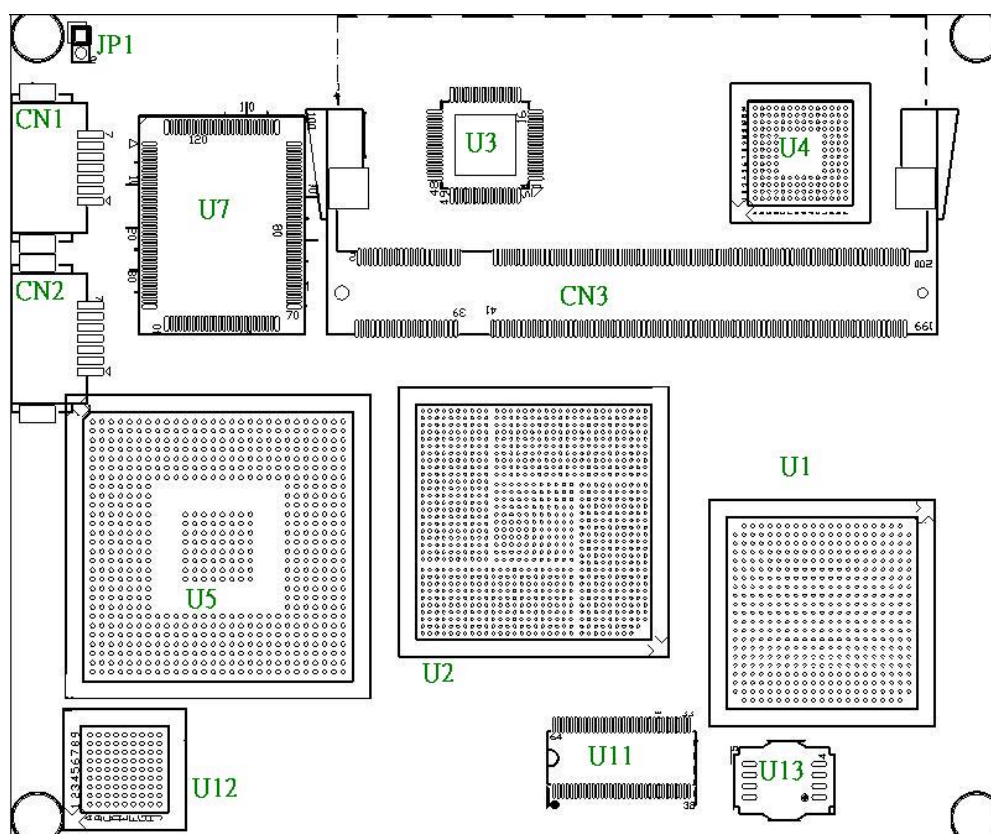


Figure 2-1 PEM-E200VLA Top-side Jumper and Connector Locations

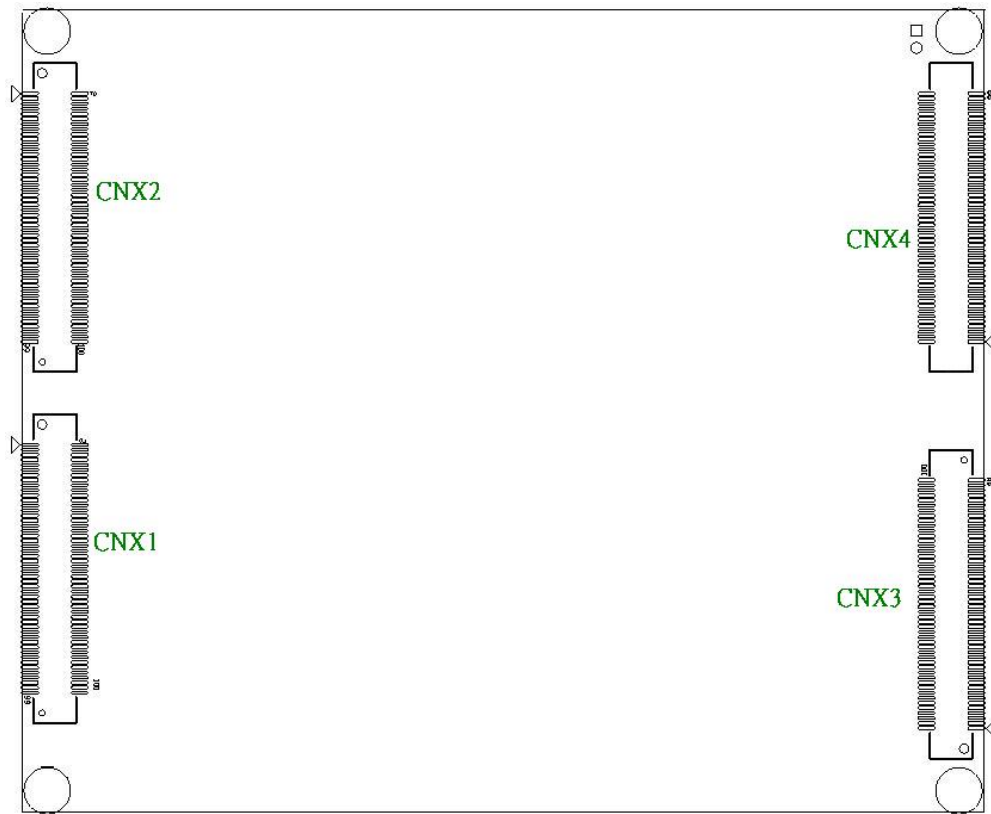


Figure 2-2 PEM-E200VLA Bottom-side Connector Locations

2.2 Connector Allocation

I/O peripheral devices are connected to the interface connectors.

Connector Function List

Connector	Description	Remark
CN1	SATA Connector (Port 0 of ICH7M)	
CN2	SATA Connector (Port 0 of ICH7M)	
CN3	DDR2 SO-DIMM	
CNX1	ETX <u>X1</u> 100Pin Connector	
CNX2	ETX <u>X2</u> 100Pin Connector	
CNX3	ETX <u>X3</u> 100Pin Connector	
CNX4	ETX <u>X4</u> 100Pin Connector	

Pin Assignments of Connectors

CNX1 : ETX X1 100Pin Connector

PIN No.	Signal Description	PIN No.	Signal Description
1	GND	2	GND
3	PCICLK3	4	PCICLK4
5	GND	6	GND
7	PCICLK1	8	PCICLK2
9	REQ3#	10	GNT3#
11	GNT2#	12	3V
13	REQ2#	14	GNT1#
15	REQ1#	16	3V
17	GNT0#	18	RESERVED
19	VCC	20	VCC
21	SERIRQ	22	REQ0#
23	AD0	24	3V
25	AD1	26	AD2
27	AD4	28	AD3
29	AD6	30	AD5
31	CBE0#	32	AD7
33	AD8	34	AD9
35	GND	36	GND
37	AD10	38	AUXAL
39	AD11	40	MIC
41	AD12	42	AUXAR
43	AD13	44	ASVCC
45	AD14	46	SNDL

47	AD15	48	ASGND
49	CBE1#	50	SNDR
51	VCC	52	VCC
53	PAR	54	SERR#
55	GPERR#	56	RESERVED
57	PME#	58	USB2-
59	LOCK#	60	DEVSEL#
61	TRDY#	62	USB3-
63	IRDY#	64	STOP#
65	FRAME#	66	USB2+
67	GND	68	GND
69	AD16	70	CBE2#
71	AD17	72	USB3+
73	AD19	74	AD18
75	AD20	76	USB0-
77	AD22	78	AD21
79	AD23	80	USB1-
81	AD24	82	CBE3#
83	VCC	84	VCC
85	AD25	86	AD26
87	AD28	88	USB0+
89	AD27	90	AD29
91	AD30	92	USB1
93	PCIRST#	94	AD31
95	INTC#	96	INTD#
97	INTA#	98	INTB#
99	GND	100	GND

CNX2 : ETX X2 100Pin Connector

PIN No.	Signal Description	PIN No.	Signal Description
1	GND	2	GND
3	SD14	4	SD15
5	SD13	6	MASTER#
7	SD12	8	DREQ7
9	SD11	10	DACK7#
11	SD10	12	DREQ6
13	SD9	14	DACK6#
15	SD8	16	DREQ5
17	MEMW#	18	DACK5#
19	MEMR#	20	DREQ0
21	LA17	22	DACK0#
23	LA18	24	IRQ14
25	LA19	26	IRQ15

27	LA20	28	IRQ12
29	LA21	30	IRQ11
31	LA22	32	IRQ10
33	LA23	34	IO16#
35	GND	36	GND
37	SBHE#	38	M16#
39	SA0	40	OSC
41	SA1	42	BALE
43	SA2	44	TC
45	SA3	46	DACK2#
47	SA4	48	IRQ3
49	SA5	50	IRQ4
51	VCC	52	VCC
53	SA6	54	IRQ5
55	SA7	56	IRQ6
57	SA8	58	IRQ7
59	SA9	60	SYSCLK
61	SA10	62	REFSH#
63	SA11	64	DREQ1
65	SA12	66	DACK1#
67	GND	68	GND
69	SA13	70	DREQ3
71	SA14	72	DACK3#
73	SA15	74	IOR#
75	SA16	76	IOW#
77	SA18	78	SA17
79	SA19	80	SMEMR#
81	IOCHRDY	82	AEN
83	VCC	84	VCC
85	SD0	86	SMEMW#
87	SD2	88	SD1
89	SD3	90	NOWS#
91	DREQ2	92	SD4
93	SD5	94	IRQ9
95	SD6	96	SD7
97	IOCHK#	98	RSTDRV
99	GND	100	GND

CNX3 : ETX X3 100Pin Connector

LVDS Interface Pinout			
PIN No.	Signal Description	PIN No.	Signal Description
1	GND	2	GND
3	R	4	B
5	HSY	6	G
7	VSX	8	DDCK
9	DETECT#	10	DDDA
11	LCDDO16	12	LCDDO18
13	LCDDO17	14	LCDDO19
15	GND	16	GND
17	LCDDO13	18	LCDDO15
19	LCDDO12	20	LCDDO14
21	GND	22	GND
23	LCDDO8	24	LCDDO11
25	LCDDO9	26	LCDDO10
27	GND	28	GND
29	LCDDO4	30	LCDDO7
31	LCDDO5	32	LCDDO6
33	GND	34	GND
35	LCDDO1	36	LCDDO3
37	LCDDO0	38	LCDDO2
39	VCC	40	VCC
41	JILI_DAT	42	LTGIO0
43	JILI_CLK	44	BLON#
45	BIASON	46	DIGON
47	COMP	48	Y
49	SYNC	50	C
Floppy Support Mode Pinout			
PIN No.	Signal Description	PIN No.	Signal Description
51	LPT/FLPY#	52	RESERVED
53	VCC	54	GND
55	RESERVED	56	DENSEL
57	RESERVED	58	RESERVED
59	IRRX	60	HDSEL#
61	IRTX	62	RESERVED
63	RXD2	64	DIR#
65	GND	66	GND
67	RTS2#	68	RESERVED
69	DTR2#	70	STEP#
71	DCD2#	72	DSKCHG#
73	DSR2#	74	RDATA#
75	CTS2#	76	WP#

77	TXD2	78	TRK0#
79	RI2#	80	INDEX#
81	VCC	82	VCC
83	RXD1	84	DRV#
85	RTS1#	86	MOT#
87	DTR1#	88	WDATA#
89	DCD1#	90	WGATE#
91	DSR1#	92	MSCLK
93	CTS1#	94	MSDAT
95	TXD1	96	KBCLK
97	RI1#	98	KBDAT
99	GND	100	GND
Parallel Port Mode Pinout			
PIN No.	Signal Description	PIN No.	Signal Description
51	LPT/FLPY#	52	RESERVED
53	VCC	54	GND
55	STB#	56	AFD#
57	RESERVED	58	PD7
59	IRRX	60	ERR#
61	IRTX	62	PD6
63	RXD2	64	INIT#
65	GND	66	GND
67	RTS2#	68	PD5
69	DTR2#	70	SLIN#
71	DCD2#	72	PD4
73	DSR2#	74	PD3
75	CTS2#	76	PD2
77	TXD2	78	PD1
79	RI2#	80	PD0
81	VCC	82	VCC
83	RXD1	84	ACK#
85	RTS1#	86	BUSY
87	DTR1#	88	PE
89	DCD1#	90	SLCT#
91	DSR1#	92	MSCLK
93	CTS1#	94	MSDAT
95	TXD1	96	KBCLK
97	RI1#	98	KBDAT
99	GND	100	GND

CNX4 : ETX X4 100Pin Connector

PIN No.	Signal Description	PIN No.	Signal Description
1	GND	2	GND
3	5V_SB	4	PWGIN
5	PS_ON#	6	SPEAKER
7	PWRBTN#	8	BATT
9	KBINH#	10	LILED#
11	RSMRST#	12	ACTLED#
13	ROMKBCS#	14	SPEEDLED#
15	EXT_PRG	16	I2CLK
17	VCC	18	VCC
19	OVCR#	20	GPCS#
21	EXTSMI#	22	I2DAT
23	SMBCLK	24	SMBDATA
25	SIDE_CS3#	26	SMBALRT#
27	SIDE_CS1#	28	DASP_S
29	SIDE_A2	30	PIDE_CS3#
31	SIDE_A0	32	PIDE_CS1#
33	GND	34	GND
35	PDIAG_S	36	PIDE_A2
37	SIDE_A1	38	PIDE_A0
39	SIDE_INTRQ	40	PIDE_A1
41	BATLOW#	42	GPE1#
43	SIDE_AK#	44	PIDE_INTRQ
45	SIDE_RDY	46	PIDE_AK#
47	SIDE_IOR#	48	PIDE_RDY
49	VCC	50	VCC
51	SIDE_IOW#	52	PIDE_IOR#
53	SIDE_DRQ	54	PIDE_IOW#
55	SIDE_D15	56	PIDE_DRQ
57	SIDE_D0	58	PIDE_D15
59	SIDE_D14	60	PIDE_D0
61	SIDE_D1	62	PIDE_D14
63	SIDE_D13	64	PIDE_D1
65	GND	66	GND
67	SIDE_D2	68	PIDE_D13
69	SIDE_D12	70	PIDE_D2
71	SIDE_D3	72	PIDE_D12
73	SIDE_D11	74	PIDE_D3
75	SIDE_D4	76	PIDE_D11
77	SIDE_D10	78	PIDE_D4
79	SIDE_D5	80	PIDE_D10
81	VCC	82	VCC

83	SIDE_D9	84	PIDE_D5
85	SIDE_D6	86	PIDE_D9
87	SIDE_D8	88	PIDE_D6
89	GPE2#	90	CBLID_P
91	RXD-	92	PIDE_D8
93	RXD+	94	SIDE_D7
95	TXD-	96	PIDE_D7
97	TXD+	98	HDRST#
99	GND	100	GND

Chapter 3

System Installation

This chapter provides you with instructions to set up your system. The additional information is enclosed to help you set up onboard PCI device.

3.1 Intel® ATOM CPU

PEM-E200VLA onboard uses Intel Atom N270 CPU 1.6GHz processor.

Introducing Intel Atom processor, a new microprocessor designed from the ground up for mobility, with a mobile-optimized chipset. Intel mobile processor innovative design techniques allow faster execution of instructions at lower power.

3.2 Main Memory

PEM-E200VLA provide 1 x 200-pin SO-DIMM sockets which supports 400/533 DDR2-SDRAM as main memory, Non-ECC (Error Checking and Correcting), non-register functions. The maximum memory size can be up to 2GB capacity. Memory clock and related settings can be detected by BIOS via SPD interface.

For system compatibility and stability, do not use memory module without brand. Memory can be used one double-sided SO-DIMM or one single-sided SO-DIMM.

Watch out the contact and lock integrity of memory module with socket, it will impact on the system reliability. Follow normal procedures to install memory module into memory socket. Before locking, make sure that all modules have been fully inserted into the card slots.

CPU FSB	Bandwidth
533MHz	4.2GB/s

Memory Frequency	Single Channel DDR Bandwidth
533MHz	4.2GB/s
400MHz	3.2GB/s

Note:

To maintain system stability, don't change any of DRAM parameters in BIOS setup to upgrade system performance without acquiring technical information.

Memory frequency / CPU FSB synchronization

PEM-E200VLA supports different memory frequencies depending on the CPU front side bus and the type of DDR2 SO-DIMM.

CPU FSB	Memory Frequency
533 MHz	533/400MHz

3.3 Installing System

To install your PEM-E200VLA into standard chassis or proprietary environment, please perform the following:

Step 1 : Check all jumpers setting on proper position

Step 2 : Install memory module on right position

Step 3 : Assembly cooler then insert the PEM-E200VLA in ETX connector of carrier board

Step 4 : Place PEM-E200VLA Series into the dedicated position in the system

Step 5 : Hook cables to existing peripheral devices and secure it

Step 6 : Install operation system and driver

Note:

Drivers can be found in the enclosed disc, otherwise, please contact your vender for drivers that you need.

3.4 Clear CMOS Operation

The following table indicates how to enable/disable Clear CMOS Function hardware circuit by putting jumpers at proper position.

JP1 : Clear CMOS

JP1	Function
Open	Normal operation ★
Short	Clear CMOS

3.5 WDT Function

You can program the timeout period for the watchdog timer in two ranges:

1-second increments from 1 to 255 seconds

1-minute increments from 1 to 255 minutes

The watchdog can release a NMI or a reset. Contact Portwell Modules technical support for information on programming and operating the WDT.

Chapter 4

BIOS Setup Information

PEM-E200VLA is equipped with the AWARD BIOS stored in Flash ROM. These BIOS has a built-in Setup program that allows users to modify the basic system configuration easily. This type of information is stored in CMOS RAM so that it is retained during power-off periods. When system is turned on, PEM-E200VLA communicates with peripheral devices and checks its hardware resources against the configuration information stored in the CMOS memory. If any error is detected, or the CMOS parameters need to be initially defined, the diagnostic program will prompt the user to enter the SETUP program. Some errors are significant enough to abort the start-up.

4.1 Entering Setup

Turn on or reboot the computer. When the message "Hit if you want to run SETUP" appears, press key immediately to enter BIOS setup program.

If the message disappears before you respond, but you still wish to enter Setup, please restart the system to try "COLD START" again by turning it OFF and then ON, or touch the "RESET" button. You may also restart from "WARM START" by pressing <Ctrl>, <Alt>, and <Delete> keys simultaneously. If you do not press the keys at the right time and the system will not boot, an error message will be displayed and you will again be asked to,

Press <F1> to Run SETUP or Resume

In HIFLEX BIOS setup, you can use the keyboard to choose among options or modify the system parameters to match the options with your system. The table below will show you all of keystroke functions in BIOS setup.

General Help	
↑ ↓ → ←	: Move
Enter	: Select
+ / - /PU /PD	: Value
ESC	: Exit
F1	: General Help
F2	: Item Help
F5	: Previous Values
F6	: Fail-Safe Defaults
F7	: Optimized Defaults
F9	: Menu in BIOS
F10	: Save

4.2 Main Menu

Once you enter PEM-E200VLA AWARD BIOS CMOS Setup Utility, a Main Menu is presented. The Main Menu allows user to select from eleven setup functions and two exit choices. Use arrow keys to switch among items and press <Enter> key to accept or bring up the sub-menu.

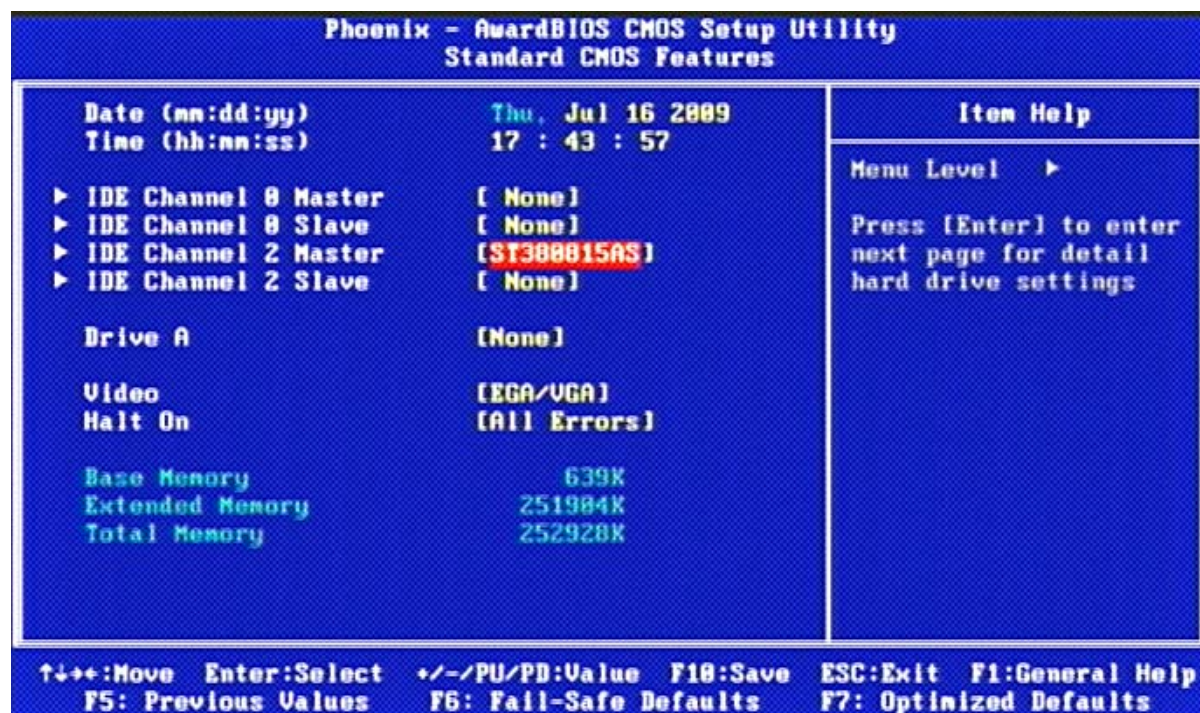
**Note:**

It is strongly recommended to reload Optimal Setting if CMOS is lost or BIOS is updated.

4.3 Standard CMOS Features

This setup page includes all the items in standard compatible BIOS. Use the arrow keys to highlight the item and then use the <PgUp>/<PgDn> or <+>/<-> keys to select the value or number you want in each item and press <Enter> key to certify it.

Follow command keys in CMOS Setup table to change **Date**, **Time**, **Drive type**, and **Boot Sector Virus Protection Status**.



Note:

Oblique items are base on memory capacity which user adopts on single board.

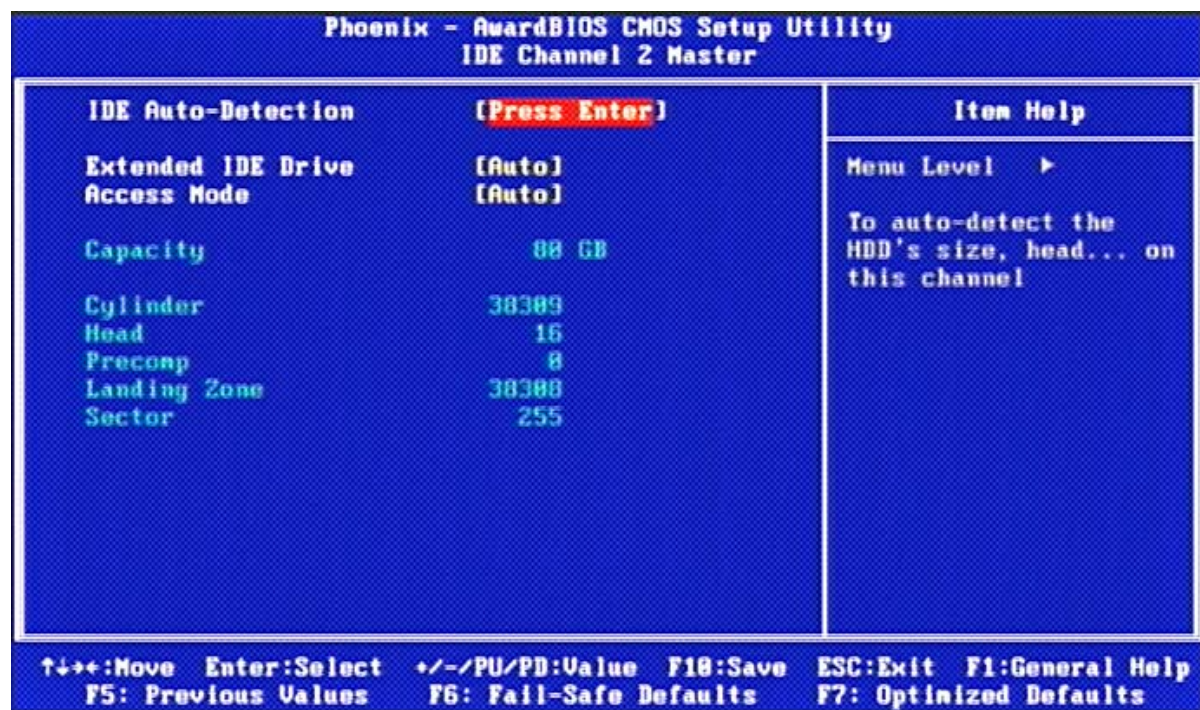
■ Menu Selections

Item	Options	Description
Date	mm:dd:yy	Change the day, month, year and century
Time	hh:mm:ss	Change the internal clock
IDE Channel 0 Master	Options are in its sub menu	Press <Enter> to enter next page for detail hard drive settings
IDE Channel 0 Slave		
IDE Channel 2 Master		
IDE Channel 2 Slave		

Video	EGA/VGA CGA 40 CGA 80 MONO	Select the default video device
Halt On	All Errors No Errors All, But Keyboard All, But Diskette All, But Disk/Key	Select the situation in which you want the BIOS to stop the POST process and notify you
Base Memory	639K	Displays the amount of conventional memory detected during boot up
Extended Memory	N/A	Displays the amount of extended memory detected during boot up
Total Memory	N/A	Displays the total memory available in the system

4.4 IDE Adaptors Setup Menu

The IDE adaptors control the IDE devices, such as hard disk drive or CD-ROM drive. It uses a separate sub menu to configure each hard disk drive.



Note:

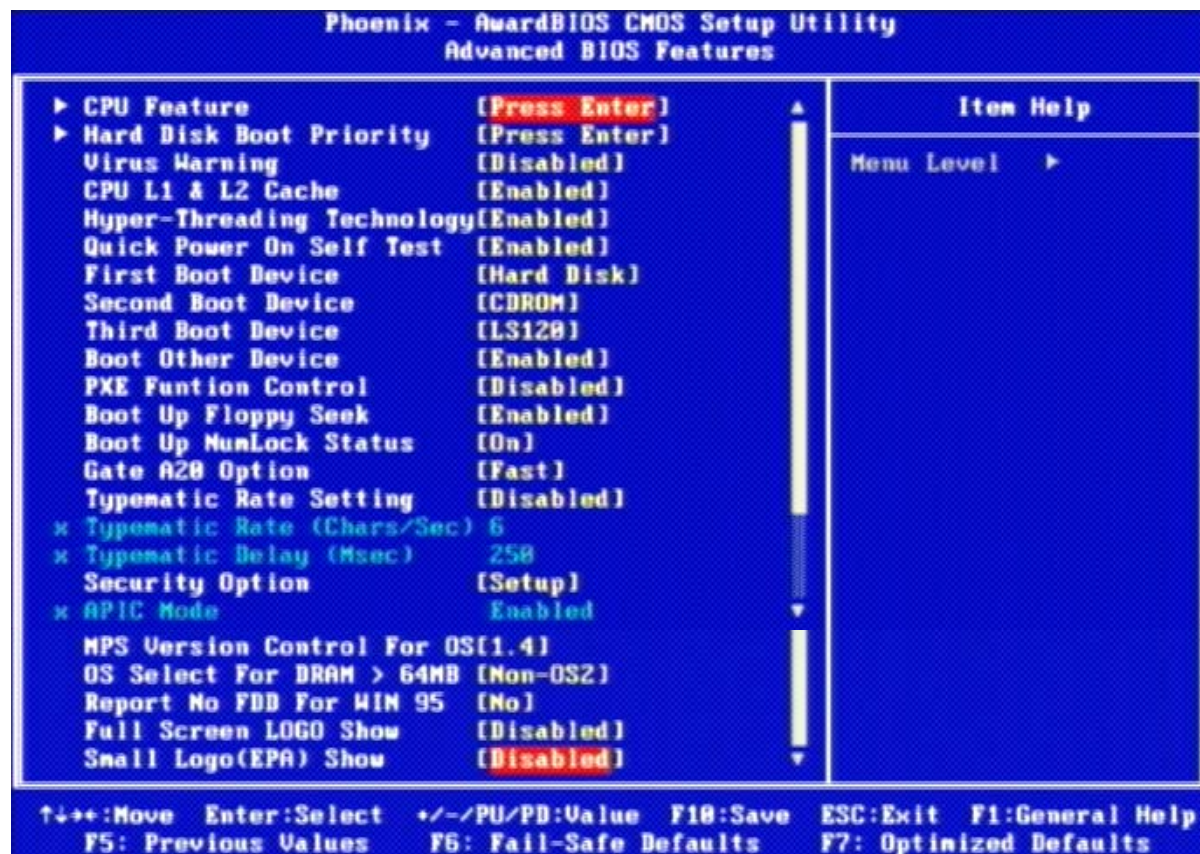
The oblique items are meaning base on what kind of storage device user employs.

■ Menu Selections

Item	Options	Description
IDE Auto-detection	Press Enter	Press Enter to auto-detect the HDD on this channel. If detection is successful, it fills the remaining fields on this menu.
IDE Channel 0 Master/Slave	None Auto Manual	Selecting 'manual' lets you set the remaining fields on this screen. Selects the type of fixed disk. "User Type" will let you select the number of cylinders, heads, etc. Note: PRECOMP=65535 means NONE !
IDE Channel 2 Master/Slave (Extend IDE Drive)	None Auto	Note: PRECOMP=65535 means NONE !
Access Mode	Large, Auto	Choose the access mode for this hard disk
Capacity	Auto Display your disk drive size	Disk drive capacity (Approximated). Note that this size is usually slightly greater than the size of a formatted disk given by a disk checking program.
The following options are selectable only if the 'IDE Primary Master' item is set to 'Manual'		
Cylinder	Min=0, Max=65535	Set the number of cylinders for hard disk
Head	Min=0, Max=255	Set the number of read/write heads
Precomp	Min=0, Max=65535	**** Warning: Setting a value of 65535 means no hard disk
Landing zone	Min=0, Max=65535	****
Sector	Min=0, Max=255	Number of sectors per track

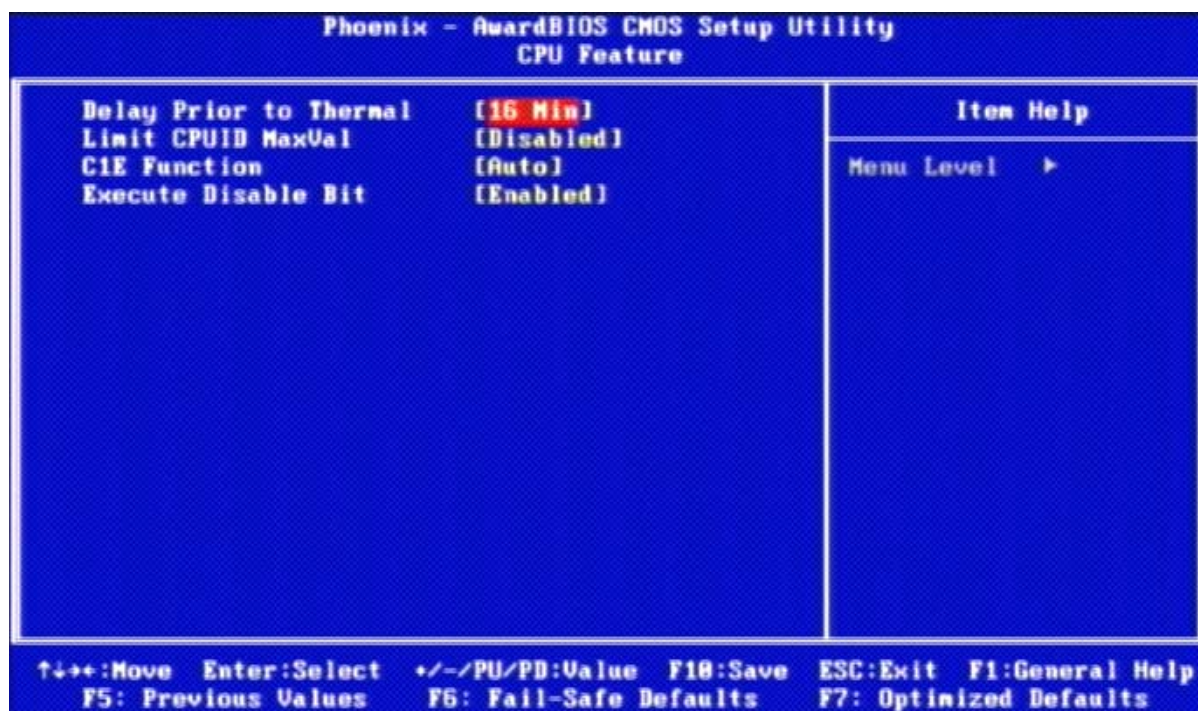
4.5 Advanced BIOS Features

This section allows you to configure your system for basic operation. You have the opportunity to select the system's default speed, boot-up sequence, keyboard operation, shadowing and security.



CPU Feature

Press Enter to configure the settings relevant to CPU Feature.



Delay Prior To Thermal

This field is used to select the time that would force the CPU to a 50% duty cycle when it exceeds its maximum operating temperature therefore protecting the CPU and the system board from overheating to ensure a safe computing environment.

Limit CPUID MaxVal

Set limit CPUID MaxVal to 3. should be " Disabled" for Windows XP.

The choice: Disabled, Enabled.

C1E Function

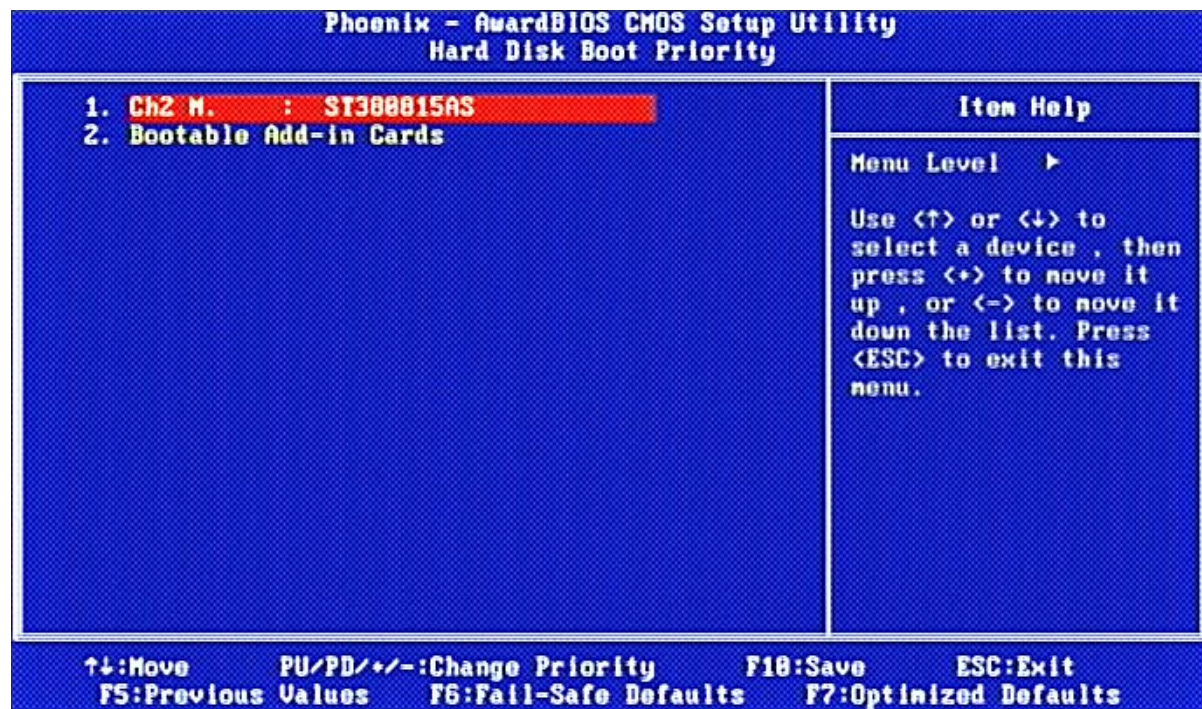
CPU C1E Function Select.

The choice: Auto, Disabled.

Execute Disabled Bit

When disabled, forces the XD feature flag to always return 0.

The choice: Enabled, Disabled.



Hard Disk Boot Priority

Select Hard Disk Boot Device Priority. Use <↑> or <↓> to select a device, then press <+> to move it up, or <-> to move it down the list. Press <ESC> to exit this menu.

Virus Warning

Allow you to choose the VIRUS warning feature for IDE Hard Disk boot sector protection. If this function is enabled and someone attempt to write data into this area, BIOS will show a warning message on screen and alarm beep.

Enabled	Activates automatically when the system boots up causing a warning message to appear when anything attempts to access the boot sector or hard disk partition table.
Disabled	No warning message will appear when anything attempts to access the boot sector or hard disk partition table.

CPU L1 Cache/L2 Cache

These two categories speed up memory access. However, it depends on CPU/chipset design.

Enabled	Enable Cache
Disabled	Disable Cache

Hyper-Threading Technology

“Enabled” for Windows XP and Linux 2.4.X (OS optimized for Hyper-Threading Technology and “Disabled” for other OS (OS not optimized for Hyper-Threading Technology).

The choice: Enabled, Disabled.

Quick Power On Self Test

Allows the system to skip certain tests while boot up. This will shorter the time to boot the system.

Enabled	Enable quick POST
Disabled	Normal POST

First/Second/Third Boot Device

Select your Boot Device Priority.

The choice: Floppy, LS120, Hard Disk, CDROM, ZIP 100, USB-FDD, USB-ZIP, USB-CDROM, Legacy LAN and Disabled.

Boot Other Device

Select your Boot Device Priority.

The choice: Enabled, Disabled.

PXE Function Control

Select your boot from PXE.

The choice: Enabled, Disabled.

Boot Up Floppy Seek

Enabled tests floppy drives to determine whether they have 40 or 80 tracks.

The choice: Enables, Disabled.

Boot Up NumLock Status

Select power on state for NumLock.

The choice: Off, On.

Gate A20 Option

Fast-lets chipsets control GateA20 and Normal – a pin in the keyboard controller controls GateA20. Default is fast.

The choice: Normal, Fast.

Typematic Rate Setting

Keyboard repeat at a rate determined by the keyboard controller – when enabled, the typematic rate and typematic delay can be selected.

The choice: Disabled, Enabled.

※Typematic Rate (Chars/sec)

The rate is which character repeats when you hold down a key.

The choice: 6, 8, 10, 12, 15, 20, 24, and 30. (Default 6)

※Typematic delay (Msec)

The delay before keystrokes begin to repeat.

The choice: 250, 500, 750, and 1000. (Default 250)

Security Option

Select whether the password is required every time the system boots or only when you enter setup.

System	The system will not boot and access to Setup will be denied if the correct password is not entered at the prompt.
Setup	The system will boot, but access to Setup will be denied if the correct password is not entered at the prompt.

APIC Mode

The choice: Enabled, Disabled.

MPS Version Control For OS

The choice: 1.1, 1.4

OS Select For DRAM > 64MB

Select OS/2 only if you are running OS/2 operating system with greater than 64MB of RAM on the system.

The choice: Non-OS2, OS2.

Report No FDD For WIN 95

The choice: No, Yes.

Full Screen LOGO Show

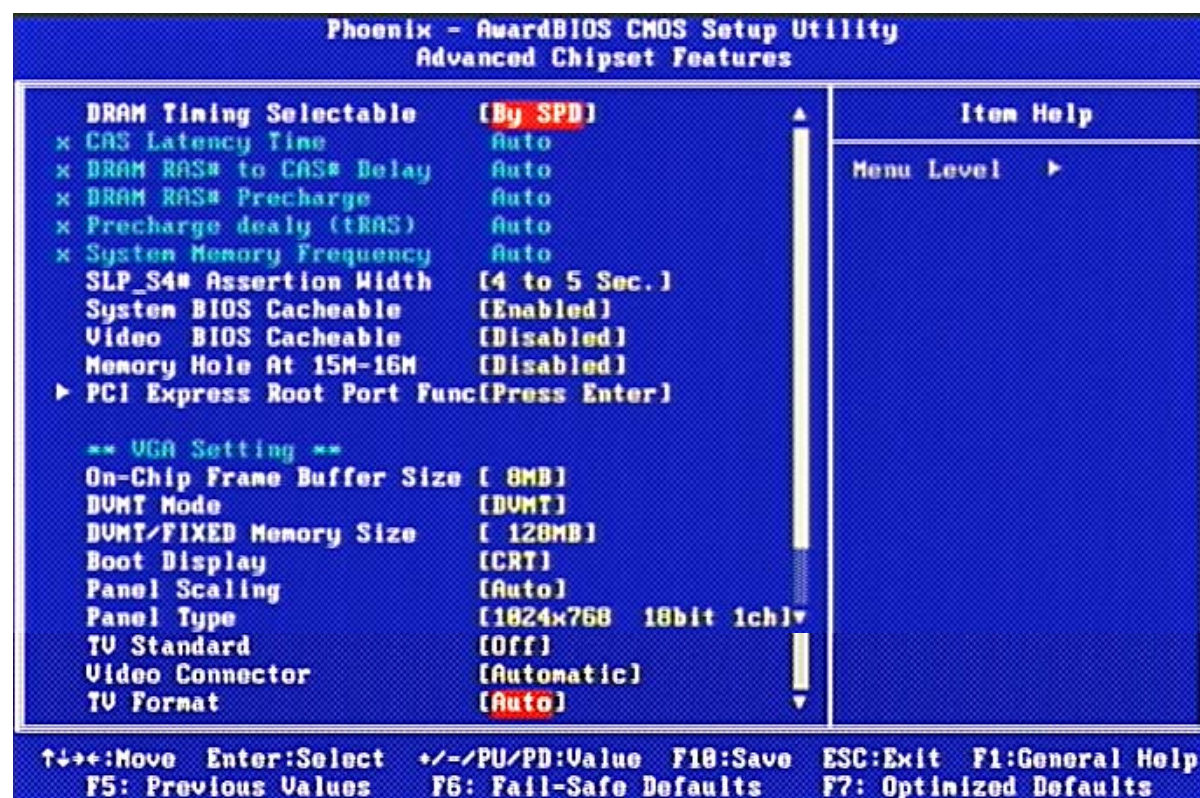
The choice: Enabled, Disabled.

Small Logo (EPA) Show

The choice: Enabled, Disabled.

4.6 Advanced Chipset Features

This section allows you to configure the system based on the specific features of the Intel 945GSE chipset. This chipset manages bus speeds and access to system memory resources, such as DDR2 SO-DIMM and the external cache. It must be stated that these items should never need to be altered. The default settings have been chosen because they provide the best operating conditions for the system. The only time user might consider making any changes would be if you discovered that data was being lost while during system operation.



DRAM Timing Selectable

This option provides DIMM plug-and-play support by serial presence detect (SPD) mechanism via the system management bus (SMBUS) interface.

The choice: Manual, By SPD.

CAS Latency Time

This option controls the number of SCLKs between the time a read command is sampled by the DRAMs and the time the GMCH samples correspondent data from the DRAMs.

The choice: 5, 4, 3, 6, and Auto.

DRAM RAS# to CAS# Delay

This option controls the number of SCLKs (SDRAM Clock) from a row activate command to a read or write command. If your system installs good quality of SDRAM, you can set this option to "3 SCLKs" to obtain better memory performance. Normally, the option will be set to Auto.

The choice: 2, 3, 4, 5, 6, and Auto.

DRAM RAS# Precharge

This option controls the number of SCLKs for RAS# precharge. If your system installs good quality of SDRAM, you can set this option to "3 SCLKs" to obtain better memory performance. It is set to auto normally.

The choice: 2, 3, 4, 5, 6, and Auto.

Precharge delay (tRAS)

The choice: 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, and 15, Auto.

System Memory Frequency

Users are recommended to use Auto for memory frequency selection.

The choice: Auto, 533MHz, 667MHz.

SLP_S4# Assertion Width

The choice: 4 to 5 Sec., 3to 4 Sec, 2 to 3 Sec., 1 to 2 Sec.

System BIOS Cacheable

Selecting Enabled allows caching of the system BIOS ROM at F0000h-FFFFFh, resulting in better system performance. However, if any program writes to this memory area, a system error may result.

The choice: Enabled, Disabled.

Video BIOS Cacheable

Select "Enabled" to enable caching VGA BIOS into L2 cache to get higher display performance. "Disabled" to ignore this BIOS caching function.

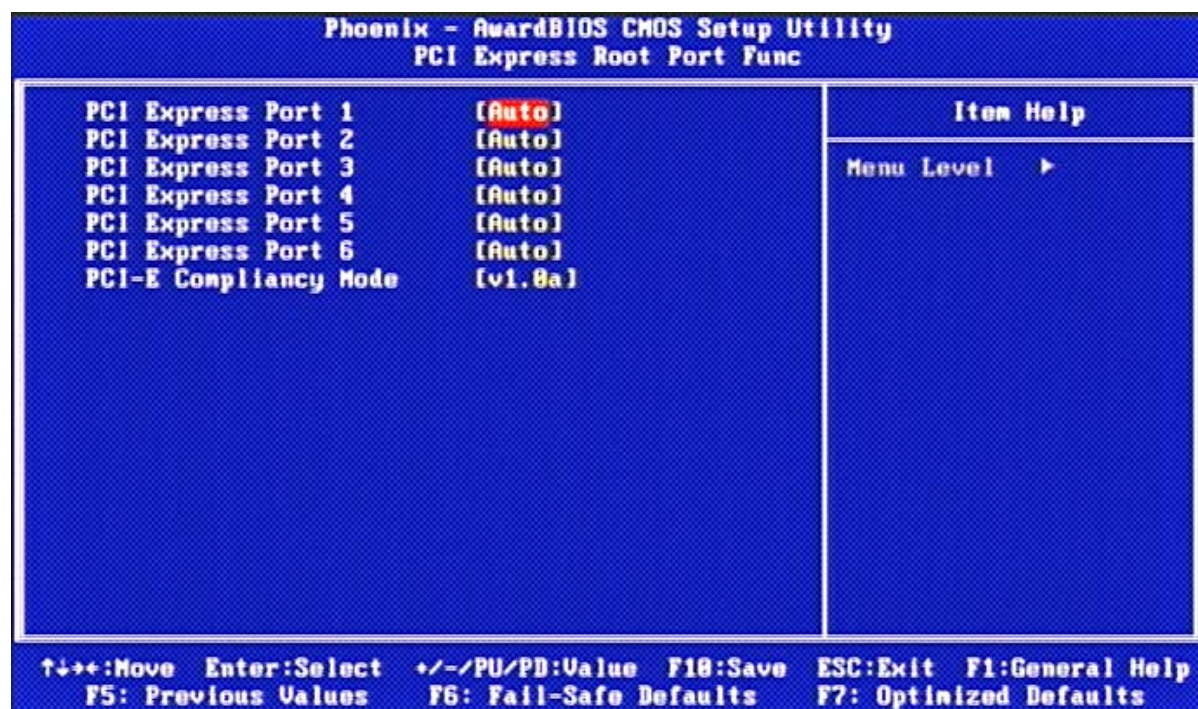
The choice: Enabled, Disabled.

Memory Hole At 15-16M

In order to improve performance, certain space in memory is reserved for ISA cards. This memory must be mapped into the memory space below 16MB.

The choice: Enabled, Disabled.

PCI Express Root Port Func



PCI Express Port 1-6

The choice: Auto, Enabled and Disabled.

PCI-E Compliancy Mode

The choice: v1.0a, v1.0.

On-Chip Frame Buffer Size

Users can set the display memory size that shared from main memory.

The choice: 1MB, 8MB.

DVMT Mode

The choice: FIXED, DVMT, BOTH

DVMT/FIXED Memory Size

The choice: 64MB, 128MB, 224MB.

Boot Display

The choice: CRT, LVDS, CRT+LVDS, TV, CRT1+CRT2.

Panel Scaling

The choice: Auto, On, Off.

Panel Type

The choice: 640x480 18bit 1ch, 800x600 18bit 1ch, 1024x768 18bit 1ch, 1280x1024 24bit 2ch, 1400x1050 18 bit 2ch, 1600x1200 24 bit 2ch.

TV Standard

The choice: Off, NTSC, PAL, SECAM.

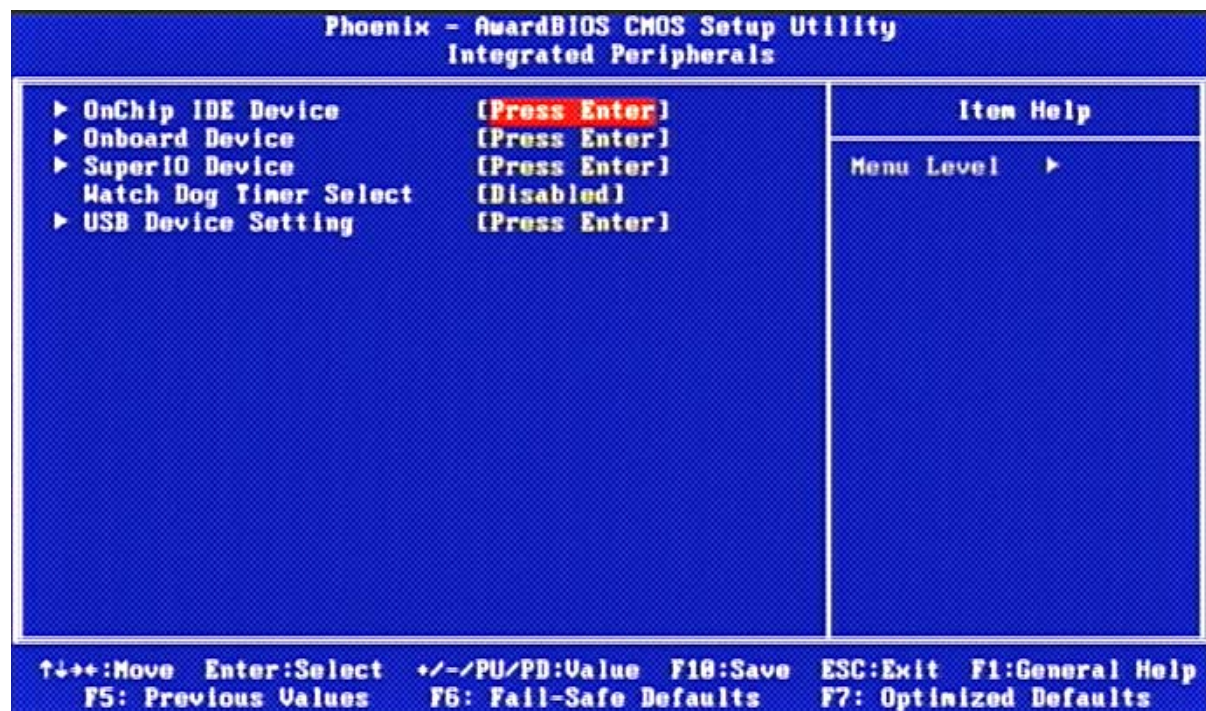
Video Connector

The choice: Automatic, Composite, Component, Both.

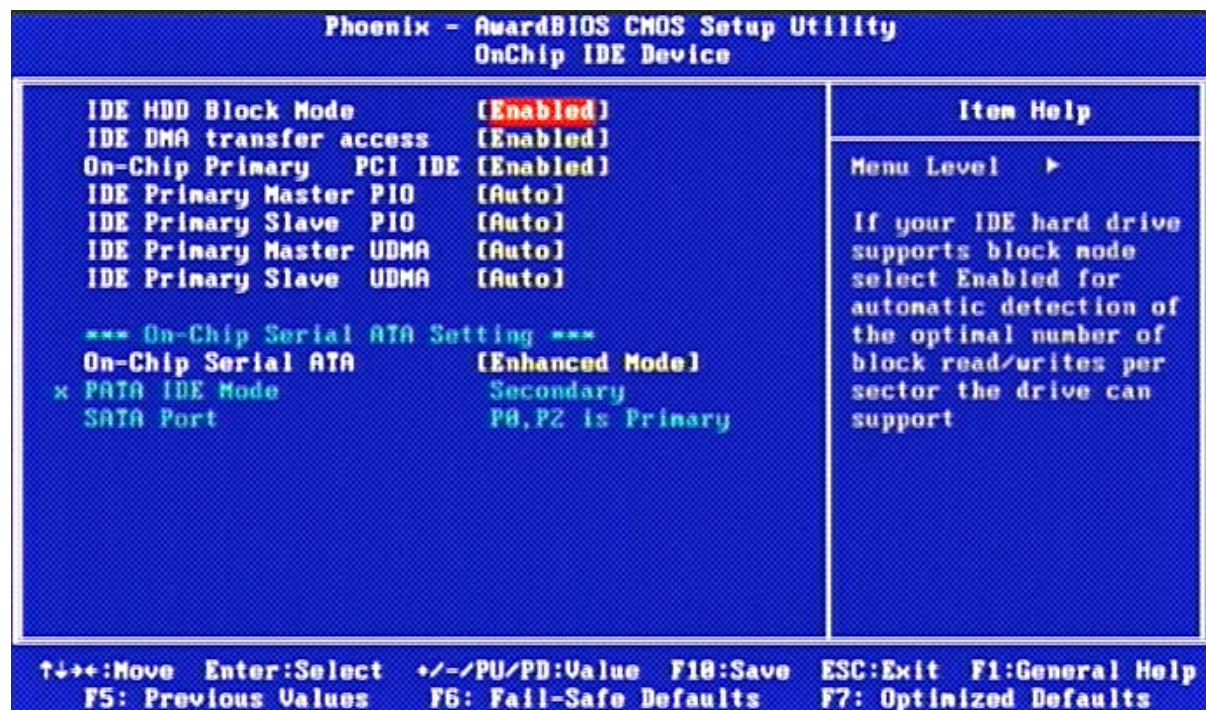
TV Format

The choice: Auto, NTSC_M, NTSC_M_J, NTSC_433, NTSC_N, PAL_B, PAL_G, PAL_D, PAL_H, PAL_I, PAL_M, PAL_N, PAL_60, SECAN_L, SECAN_L1, SECAN_B, SECAN_D, SECAN_G, SECAN_H, SECAN_K, SECAN_K1.

4.7 Integrated Peripherals



OnChip IDE Device



IDE HDD Block Mode

If IDE hard drive supports block mode select Enabled for automatic detection of the optimal number of block read/writes per sector the drive can support.

The choice: Enabled, Disabled.

IDE DMA transfer access

The choice: Enabled, Disabled.

On-Chip Primary/ Secondary PCI IDE

The chipset contains a PCI IDE interface with support for two IDE channels. Select Enabled to activate the primary IDE interface. Select Disabled to deactivate this interface.

The choice: Enabled, Disabled

IDE Primary/Secondary Master/Slave PIO

The four IDE PIO (Programmed Input/Output) fields allow set a PIO mode (0-4) for each of the four IDE devices that the onboard IDE interface supports. Modes 0 through 4 provide successively increased performance. In Auto mode, the system automatically determines the best mode for each device.

The choice: Auto, Mode 0, Mode 1, Mode 2, Mode 3, Mode 4.

IDE Primary/Secondary Master/Slave UDMA

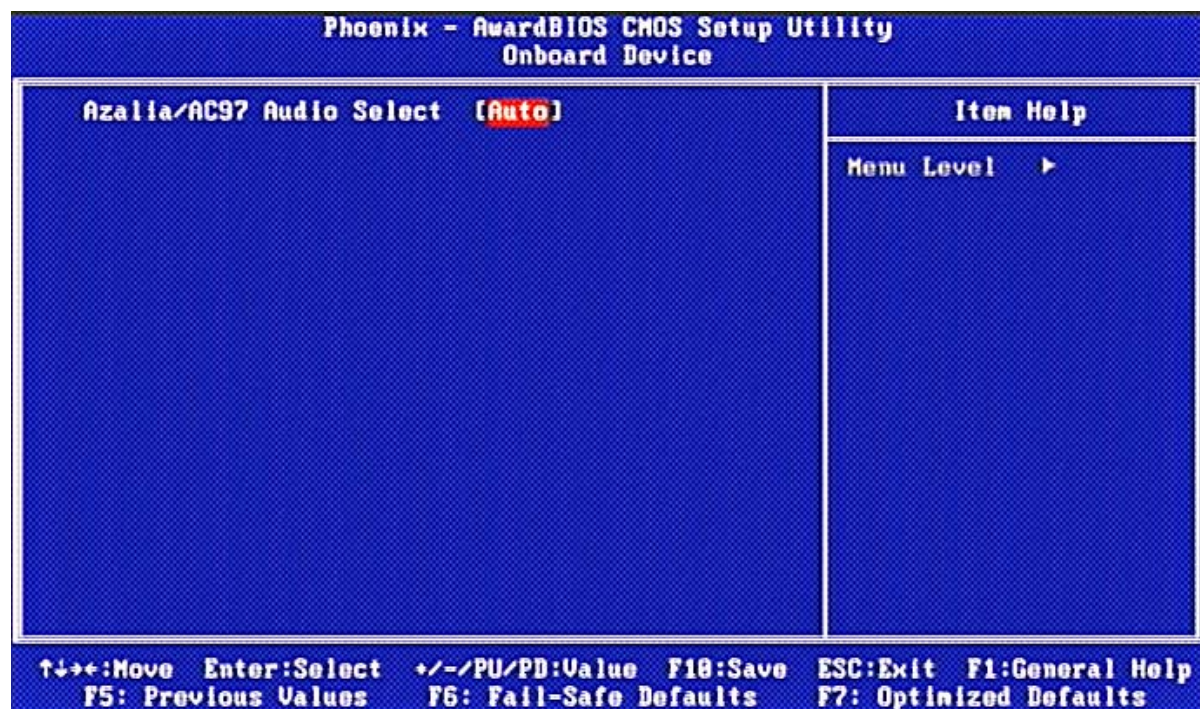
Ultra DMA/33/66/100 implementation is possible only if IDE hard drive supports and the operating environment includes a DMA driver (Windows 95 OSR2 or a third-party IDE bus master driver). If your hard drive and system software both support Ultra DMA/33/66/100, select Auto to enable BIOS support.

The choice: Auto, Disabled.

On-Chip Serial ATA

Disabled	Disabled SATA Controller
Auto	Auto arrange by BIOS
Combined Mode	PATA and SATA are combined-max. 2 IDE drivers in each channel
Enhanced Mode	Both SATA and PATA-max are enabled. 6 IDE drivers are supported
SATA Only	SATA is operating in legacy mode

Onboard Device



Azalia/AC97 Audio Select

This item allows control to Enable/Disable Audio function.

The choice: Auto, Disabled.

SuperIO Device



Onboard Serial Port 1/Port 2

Select an address and corresponding interrupt for the first and second serial ports.

The choice: Disabled, 3F8/IRQ4, 2F8/IRQ3, 3E8/IRQ4, 2E8/IRQ3, Auto.

UART Mode Select

The choice: IrDA, ASKIR, Normal

RxD, TxD Active

This item is to configure Infrared transmission rate. Four options are available:

Hi, Hi	High rate for receiving / High rate for transmitting
Hi, Lo	High rate for receiving / Low rate for transmitting
Lo, Hi	Low rate for receiving / High rate for transmitting
Lo, Lo	Low rate for receiving / Low rate for transmitting

IR Transmission Delay

This option will be available when IR is Enabled.

The choice: Enabled, Disabled.

UR2 Duplex Mode

The available choices are full duplex mode and half duplex mode

The choice: Full, Half.

Use IR Pins

The available choices are IR-Rx2Tx2/ RxD2, TxD2.

The choice: IR-Rx2Tx2 / RxD2, TxD2.

Onboard Parallel Port

This item allows you to configure I/O address of the onboard parallel port.

The choice: Disabled, 378/IRQ7, 278/IRQ5, 3BC/IRQ7.

Parallel Port Mode

There are five different modes for the onboard parallel port.

The choice: SPP, EPP, ECP, ECP+EPP and Normal.

EPP Mode Select

Select different version of EPP mode.

The choice: EPP1.7, EPP1.9.

ECP Mode Use DMA

Select a proper DMA channel for ECP mode.

The choice: 3, 1.

Parallel Port/Floppy Select

The choice: Parallel Port, Floppy.

PWRON After PWR-Fail

This item allows user to configure the power status of using ATX power supply after a serious power loss occurs.

The choice: Off, On, Former-Sts

Watch Dog Timer Select

This BIOS testing option is able to reset the system according to the selected table.

The choice: Disabled, 10 Sec, 20 Sec, 30 Sec, 40 Sec, 1 Min, 2 Min, and 4 Min.

USB Device Setting

USB 1.0 Controller

[Enabled] or [Disabled] Universal host controller interface for universal serial bus.

The choice: Enabled, Disabled.

USB 2.0 Controller

[Enabled] or [Disabled] Enhanced host controller interface for universal serial bus.

The choice: Enabled, Disabled.

USB Operation Mode

Auto decides USB device operation mode. [High speed]: If USB device was high speed device, and then it operated on high speed mode. If USB device was full/low speed device, then it operated on full/low speed mode; [Full/Low speed]: All of USB device operated on Full/Low speed mode.

The choice: High Speed, Full/Low Speed.

USB Keyboard/Mouse Function

[Enabled] or [Disabled] Legacy support of USB keyboard or mouse.

The choice: Disabled, Enabled.

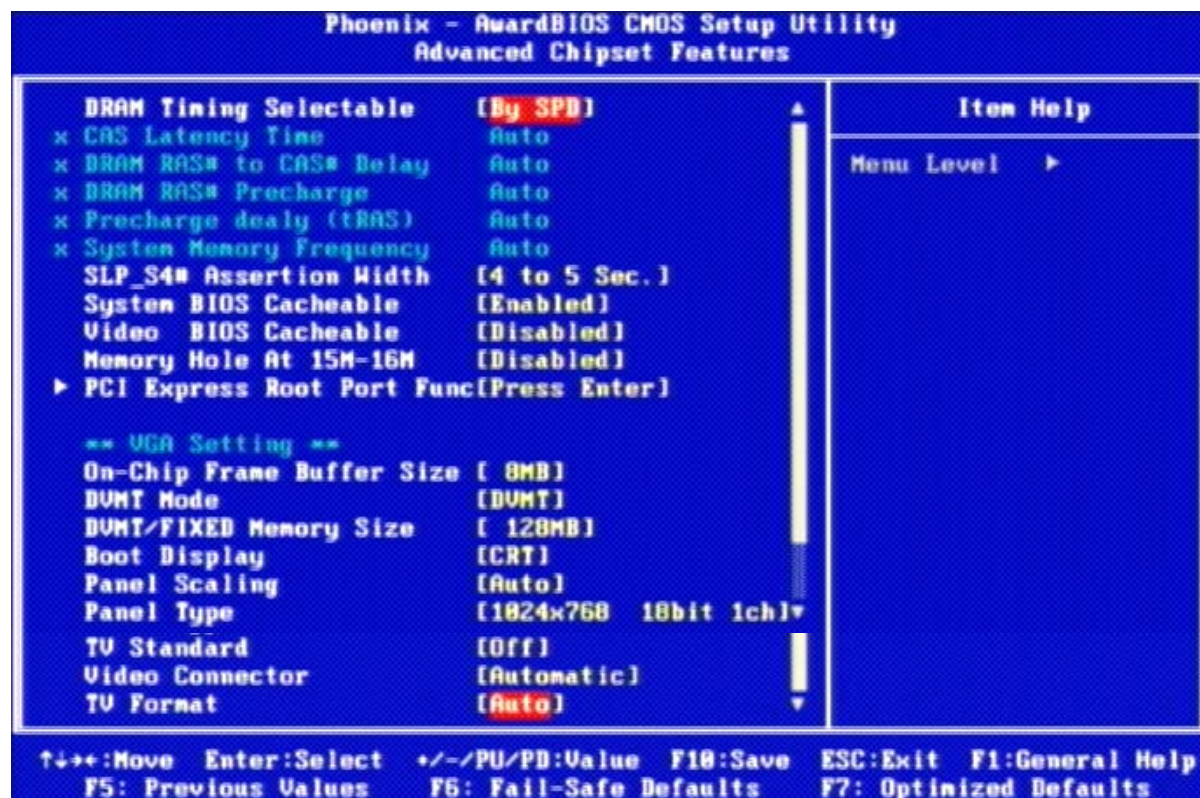
USB Storage Function

[Enabled] or [Disabled] Legacy support of USB Mass Storage.

The choice: Disabled, Enabled.

4.8 Power Management Setup

The Power Management Setup allows configuration of the system to most effectively save energy while operating in a manner consistent with your own style of computer use.



ACPI Function

This item allows you to enable/disable the Advanced Configuration and Power Management (ACPI).

The choice: Enabled, Disabled.

ACPI Suspend Type

To decide which ACPI suspend mode to use.

The choice: S1 (POS), S3 (STR).

Run VGA BIOS if S3 Resume

The choice: Auto, Yes, No.

Power Management

This category allows selecting the type (or degree) of power saving and is directly related to “HDD Power Down”, “Suspend Mode”.

There are three selections for Power Management, three of which have fixed mode settings.

Min. Saving	Minimum power management. Suspend Mode = 1 Hour, and HDD Power Down = 15 Min.
Max. Saving	Maximum power management. Suspend Mode = 1 Min., and HDD Power Down = 1 Min.
User Define	Allows you to set each mode individually. When not disabled, Suspend Mode ranges from 1 min. to 1 Hour and HDD Power Down ranges from 1 Min. to 15 Min.

Video off Method

This determines the manner in which the monitor is blanked.

V/H SYNC+Blank	This selection will cause the system to turn off the vertical and horizontal synchronization ports and write blanks to the video buffer.
Blank Screen	This option only writes blanks to the video buffer.
DPMS	Initial display power management signaling.

Video Off In Suspend

This allows user to enable/disable video off in Suspend Mode.

The choice: Yes, No.

Suspend Type

Two options are available: Stop Grant and PwrOn Suspend.

The choice: Stop Grant, PwrOn Suspend.

MODEM Use IRQ

The choice: NA, 3, 4, 5,7,9,10,11.

Suspend Mode

When enabled and after the set time of system inactivity, all devices except the CPU will be shut off.

The choice: Disabled, 1 Min, 2 Min, 4 Min, 8 Min, 12 Min, 20 Min, 30 Min, 40 Min, and 1 Hour.

HDD Power Down

When enabled and after the set time of system inactivity, the hard disk drive will be powered down while all other devices remain active.

The choice: Disabled, 1 Min, 2 Min, 3 Min, 4 Min, 5 Min, 6 Min, 7 Min, 8 Min, 9 Min, 10 Min, 11 Min, 12 Min, 13 Min, 14 Min, and 15 Min.

Soft-Off by PWR-BTTN

This item allows users to set the time to remove the power after the power button is pressed.

The choice: Instant-Off, Delay 4 Sec.

Wake-Up by PCI Card

The choice: Disabled, Enabled.

Power On by Ring

Select "Enabled", a system that is at soft-off mode will be alert to Wake-On-Modem.

The choice: Enabled, Disabled.

USB KB Wake-Up From S3

The choice: Enabled, Disabled.

Resume by Alarm

This item allows users to enable/disable the resume by alarm function. When "Enabled" is selected, system using ATX power supply could be powered on if a customized time and day is approached.

The choice: Enabled, Disabled.

※Date(of Month) Alarm

When "Resume by Alarm" is enabled, this item could allow users to configure the date parameter of the timing dateline on which to power on the system.

The choice: 0 ~ 31.

※Time (hh:mm:ss) Alarm

When "Resume by Alarm" is enabled, this item could allow users to configure the time parameter of the timing dateline on which to power on the system.

The choice: hh (0~23), mm (0~59), ss (0 ~59).

Primary/Secondary IDE 0/1

This item is to configure IDE devices being monitored by system so as to keep system out of suspend mode if the associated device is busy.

The choice: Enabled, Disabled.

FDD, COM, LPT Port

This item is to configure floppy device, COM ports, and parallel port being monitored by system so as to keep system out of suspend mode if the associated device is busy.

The choice: Enabled, Disabled.

PCI PIRQ[A-D]#

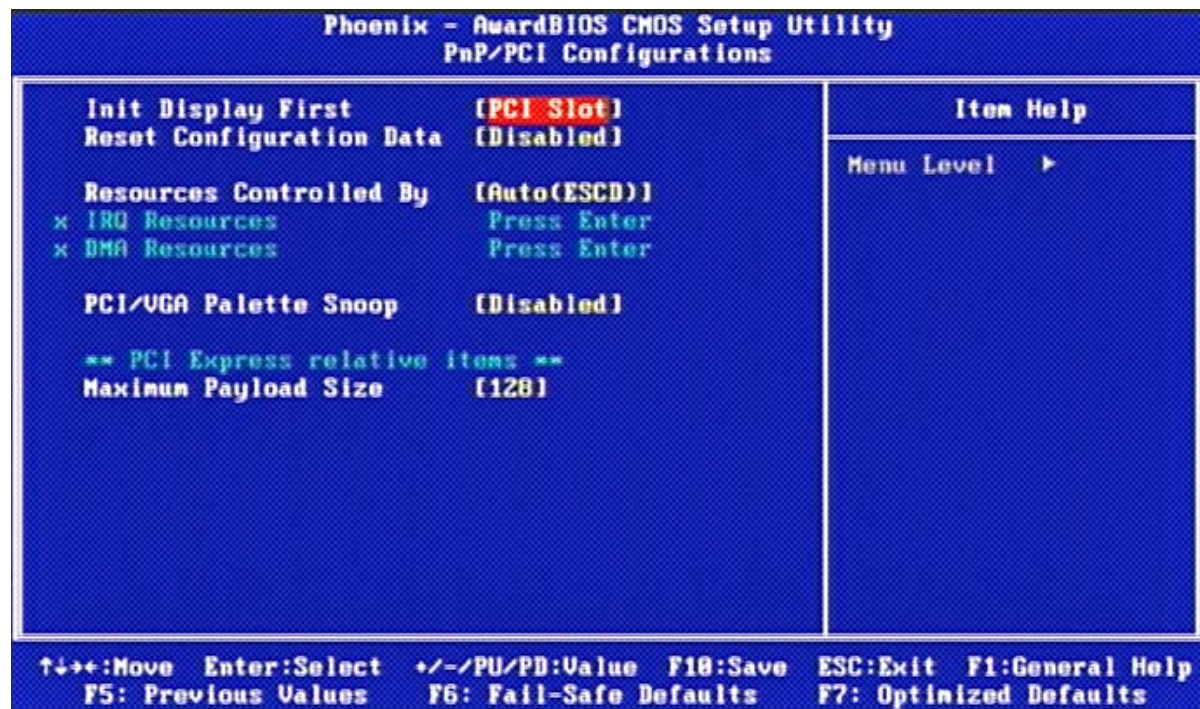
This option can be used to detect PCI device activities. If they are activities, the system will go into sleep mode.

The choice: Enabled, Disabled.

4.9 PnP/PCI Configurations

This section describes configuring the PCI bus system. PCI, or Personal Computer Interconnect, is a system which allows I/O devices to operate at speeds nearing the speed the CPU itself uses when communicating with its own special components.

This section covers some very technical items and it is strongly recommended that only experienced users should make any changes to the default settings.



Init Display First

The choice: PCI Slot, Onboard, PCIEx.

Reset Configuration Data

Default is Disabled. Select Enabled to reset Extended System Configuration Data (ESCD) when you exit Setup if you have installed a new add-on and the system reconfiguration has caused such a serious conflict that the OS cannot boot.

The choice: Enabled, Disabled.

Resource Controlled By

BIOS can automatically configure the entire boot and plug and play compatible devices. If set to Auto, IRQ DMA and memory base address fields can not be selected, since BIOS automatically assigns them.

The choice: Auto (ESCD), Manual.

※IRQ Resources

When resources are controlled manually, assign each system interrupt a type, depending on the type of device using the interrupt.

The choice: Press Enter.

IRQ-3/IRQ-4/IRQ-5/IRQ-7/IRQ-9/IRQ-10/IRQ-11/IRQ-12/IRQ-14/IRQ-15 assigned to.

The choice: PCI/ISA PnP, Legacy ISA.

※DMA Resources

When resources are controlled manually, assign each system interrupt a type, depending on the type of device using the DMA Resource.

The choice: Press Enter.

DMA-0, DMA-1, DMA-3, DMA-5, DMA-6, DMA-7 assigned to.

The choice: PCI/ISA PnP, Legacy ISA.

PCI/VGA Palette Snoop

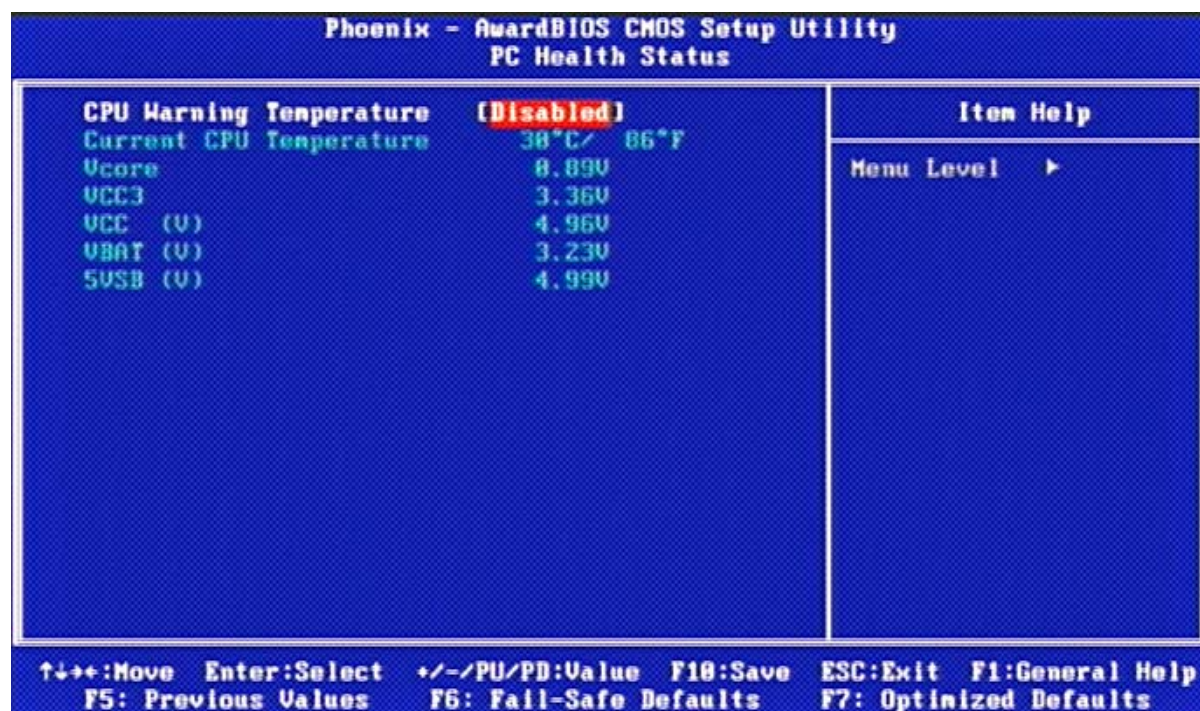
Legacy ISA for devices compliant with the original PC AT bus specification, PCI PnP for devices compliant with the plug and play standard whether designed for PCI bus architecture.

The choice: Enabled, Disabled.

Maximum Payload Size.

The choice: 128, 256, 512, 1024, 2048, 4096.

4.10 PC Health Status

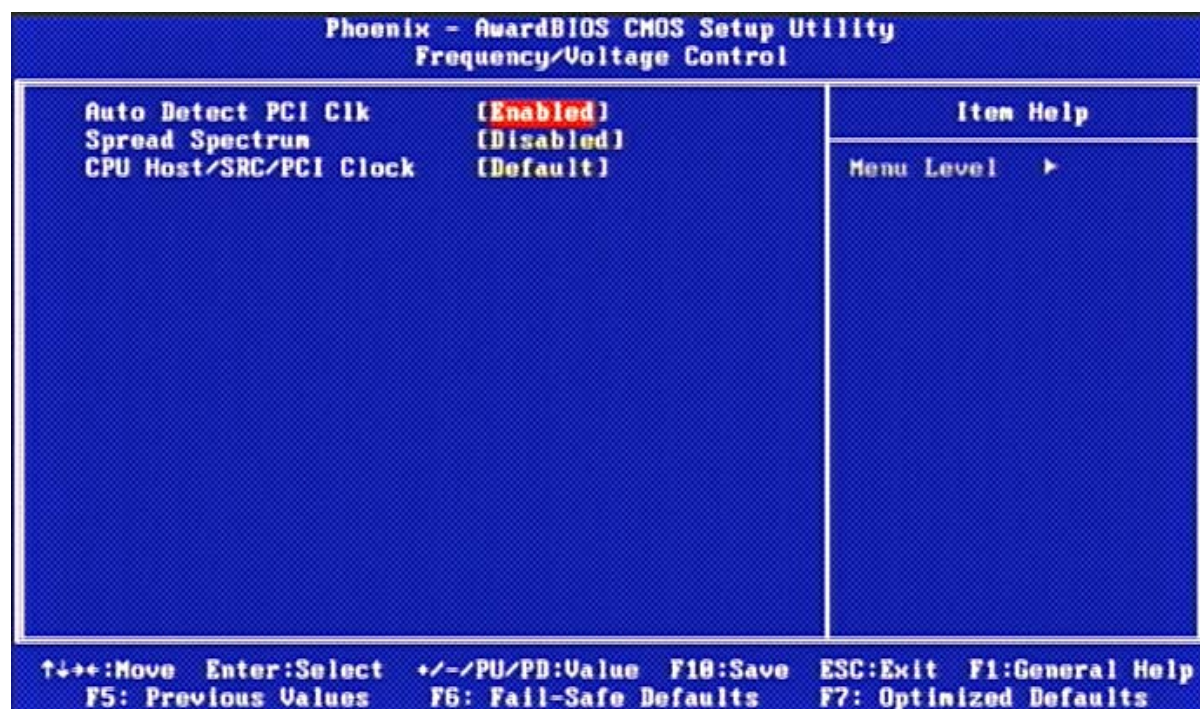


CPU Warning Temperature

This item allows you to set a temperature above which the system will start the beeping warning. Default setting is disabled. This function will only work with “ACPI” power management and “S3 (STR)” suspend type.

The choices : Disabled, 50°C / 122°F, 53°C / 127°F, 56°C / 133°F, 60°C / 140°F, 63°C / 145°F, 66°C / 151°F, 70°C / 158°F.

4.11 Frequency/Voltage Control



Auto Detect PCI Clk

The choice: Enabled, Disabled.

Spread Spectrum

This item allows user to enable/disable the spread spectrum modulate.

The choice: Enabled, Disabled.

CPU Host/SRC/PCI Clock

The choice: Default, 100/100/33MHz, 133/100/33Mhz, 166/100/33MHz, 200/100/33Mhz, 266/100/33MHz, 333/100/33MHz

4.12 Default Menu

Selecting “Defaults” from the main menu shows two options which are described below.

Load Fail-Safe Defaults

When <Enter> is pressed, a confirmation dialog box with a message similar to:

Load Fail-Safe Defaults (Y/N) ? **N**

Pressing ‘Y’ loads the BIOS default values for the most stable, minimal-performance system operations.

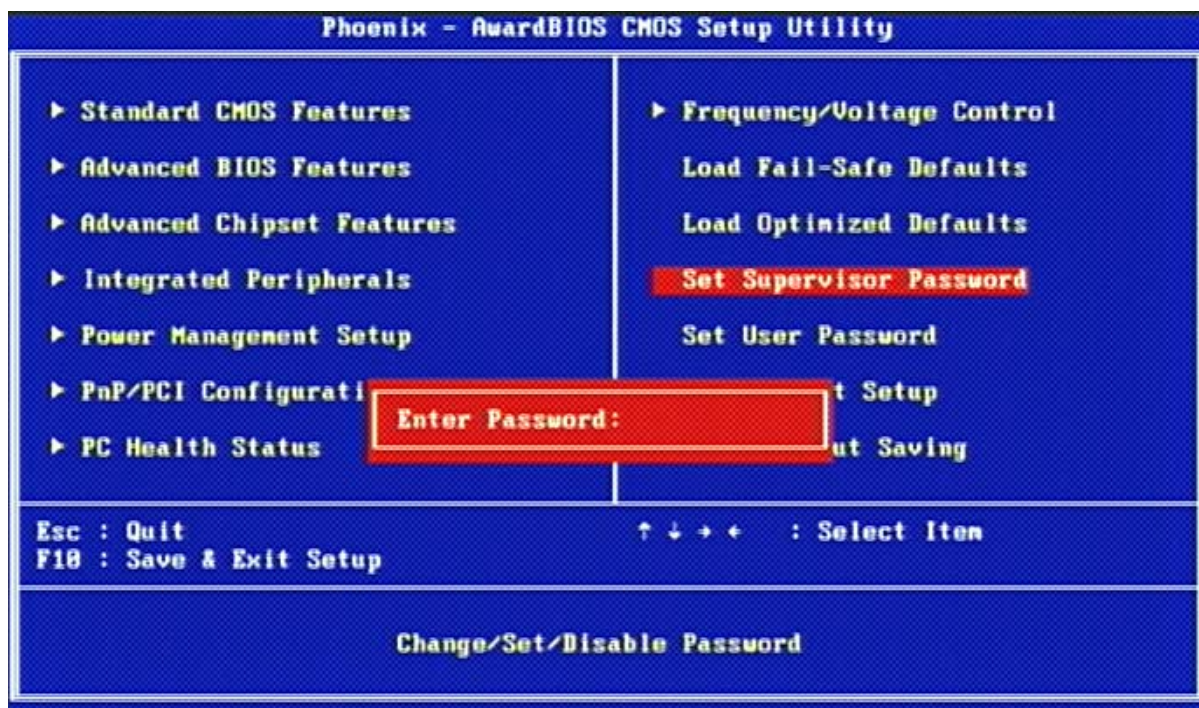
Load Optimized Defaults

When <Enter> is pressed, a confirmation dialog box with a message similar to:

Load Optimized Defaults (Y/N) ? **N**

Pressing ‘Y’ loads the default values that are factory settings for optimal performance system operations.

4.13 Set Supervisor/User Password Setting



Either supervisor or user password can be setup, or both of them. The differences between are:

Set Supervisor Password: can enter and change the options of the setup menus.

Set User Password: just can only enter but do not have the right to change the options of the setup menus. When selecting this function, the following message will appear at the center of the screen to assist you in creating a password.

ENTER PASSWORD

Type the password, up to eight characters in length, and press <Enter>. The password typed now will clear any previously entered password from CMOS memory. You will be asked to confirm the password. Type the password again and press <Enter>. You may also press <Esc> to abort the selection and not enter a password.

To disable a password, just press <Enter> when prompted to enter the password. A message will confirm the password will be disabled. Once the password is disabled, the system will reboot and Setup can be entered freely.

PASSWORD DISABLED

When a password has been enabled, user will be prompted to enter it every time user tries to enter Setup. This prevents an unauthorized person from changing any part of your system configuration.

Additionally, when a password is enabled, you can also require the BIOS to request a password every time your system is rebooted. This would prevent unauthorized use of the computer.

User may determine when the password is required within the BIOS Features Setup Menu and its Security option (see Section 3). If the Security option is set to "System", the password will be required both at boot and at entry to Setup. If set to "Setup", prompting only occurs when trying to enter Setup.

4.14 Exiting Selection

Save & Exit Setup

Pressing <Enter> on this item asks for confirmation:

Save to CMOS and EXIT (Y/N)? **Y**

Pressing “Y” stores the selections made in the menus in CMOS – a special section of memory that stays on after system off. During subsequent booting of computer, the BIOS configures the system according to the Setup selections stored in CMOS. After saving the values the system is restarted again.

Exit Without Saving

Pressing <Enter> on this item asks for confirmation:

Quit Without Saving (Y/N)? **N**

This allows user to exit Setup without storing in CMOS any change. The previous selections remain in effect. This exits the Setup utility and restarts your computer.

Chapter 5

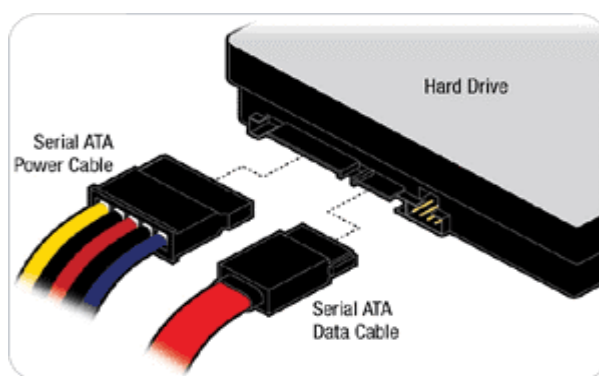
Troubleshooting

This chapter provides a few useful tips to quickly get PEM-E200VLA running with success. As basic hardware installation has been addressed in Chapter 2, this chapter will primarily focus on system integration issues, in terms of BIOS setting, and OS diagnostics.

5.1 Hardware Quick Installation

Serial ATA Hard Disk Setting

Unlike IDE bus, each Serial ATA channel can only connect to one SATA hard disk at a time; there are total two connectors, CN1 and CN2. The installation of Serial ATA is simpler and easier than IDE, because SATA hard disk doesn't require setting up Master and Slave, which can reduce mistake of hardware installation.



5.2 BIOS Setting

It is assumed that users have correctly adopted modules and connected all the devices cables required before turning on DC 12V power. 200-pin DDR2 SDRAM, keyboard, mouse, SATA hard disk, VGA connector, device power cables, ATX accessories are good examples that deserve attention. With no assurance of properly and correctly accommodating these modules and devices, it is very possible to encounter system failures that result in malfunction of any device.

To make sure that you have a successful start with PEM-E200VLA, it is recommended, when going with the boot-up sequence, to hit "DEL" key and enter the BIOS setup menu to tune up a stable BIOS configuration so that you can wake up your system far well.

Loading the default optimal setting

When prompted with the main setup menu, please scroll down to “**Load Optimized Defaults**”, press “Enter” and “Y” to load in default optimal BIOS setup. This will force your BIOS setting back to the initial factory configuration. It is recommended to do this so you can be sure the system is running with the BIOS setting that Portwell has highly endorsed. As a matter of fact, users can load the default BIOS setting any time when system appears to be unstable in boot up sequence.

Auto Detect Hard Disks

In the BIOS => Standard CMOS setup menu, pick up any one from Primary/Secondary Master/Slave IDE ports, and press “Enter”. Setup the selected IDE port and its access mode to “Auto”. This will force system to automatically pick up the IDE devices that are being connected each time system boots up.

Improper disable operation

There are too many occasions where users disable a certain device/feature in one application through BIOS setting. These variables may not be set back to the original values when needed. These devices/features will certainly fail to be detected.

When the above conditions happen, it is strongly recommended to check the BIOS settings. Make sure certain items are set as they should be. These include the COM1/COM2 ports, USB ports, external cache, on-board VGA and Ethernet.

It is also very common that users would like to disable a certain device/port to release IRQ resource. A few good examples are

Disable COM1 serial port to release IRQ #4
Disable COM2 serial port to release IRQ #3
Etc...

A quick review of the basic IRQ mapping is given below for your reference.

IRQ#	Description
IRQ #0	System Timer
IRQ #1	Keyboard Event
IRQ #2	Usable IRQ
IRQ #3	COM2
IRQ #4	COM1
IRQ #5	Usable IRQ
IRQ #6	Diskette Event
IRQ #7	Usable IRQ
IRQ #8	Real-Time Clock
IRQ #9	Usable IRQ
IRQ #10	Usable IRQ
IRQ #11	Usable IRQ
IRQ #12	IBM Mouse Event
IRQ #13	Coprocessor Error
IRQ #14	Hard Disk Event
IRQ #15	Usable IRQ

It is then very easy to find out which IRQ resource is ready for additional peripherals. If IRQ resource is not enough, please disable some devices listed above to release further IRQ numbers.

5.3 FAQ

Symptom: SBC keeps beeping, and no screen has shown.

Solution: In fact, each beep sound represents different definition of error message. Please refer to table as following:

Beep sounds	Meaning	Action
One long beep with one short beeps	DRAM error	Change DRAM or reinstall it
One long beep constantly	DRAM error	Change DRAM or reinstall it
One long beep with two short beeps	Monitor or Display Card error	Please check Monitor connector whether it inserts properly
Beep rapidly	Power error warning	Please check Power mode setting

Information & Support

Question: I forget my password of system BIOS, what am I supposed to do?

Answer: You can simply short 1-2 pins on JP1 to clean your password.

Note:

Please visit our technical web site at

<http://www.portwell.com.tw>

For additional technical information, which is not covered in this manual, you can mail to tsd@mail.portwell.com.tw or you can also send mail to our sales, they will be very delighted to forward them to us.

System Memory Address Map

Each On-board device in the system is assigned a set of memory addresses, which also can be identical of the device. The following table lists the system memory address used for your reference.

Memory Area	Size	Device Description
0000-003F	1K	Interrupt Area
0040-004F	0.3K	BIOS Data Area
0050-006F	0.5K	System Data
0070-0E2E	54K	DOS
0E2F-0F6B	5K	Program Area
0F6C-9EFF	574K	[Available]
= Conventional memory ends at 636K =		
9F00-9FBF	3K	Extended BIOS Area
9FC0-9FFF	1K	Unused
A000-AFFF	64K	VGA Graphics
B000-B7FF	32K	Unused
B800-BFFF	32K	VGA Text
C000-CEBF	59K	Video ROM
CEC0- EFFF	133K	Unused
F000-FFFF	64K	System ROM

Interrupt Request Lines (IRQ)

Peripheral devices can use interrupt request lines to notify CPU for the service required. The following table shows the IRQ used by the devices on board.

IRQ#	Current Use	Default Use
IRQ 0	System ROM	System Timer
IRQ 1	System ROM	Keyboard Event
IRQ 2	[Unassigned]	Usable IRQ
IRQ 3	System ROM	COM2
IRQ 4	System ROM	COM1
IRQ 5	[Unassigned]	Usable IRQ
IRQ 6	System ROM	Diskette Event
IRQ 7	[Unassigned]	Usable IRQ
IRQ 8	System ROM	Real-Time Clock
IRQ 9	[Unassigned]	Usable IRQ
IRQ 10	[Unassigned]	Usable IRQ
IRQ 11	[Unassigned]	Usable IRQ
IRQ 12	System ROM	IBM Mouse Event
IRQ 13	System ROM	Coprocessor Error
IRQ 14	System ROM	Hard Disk Event
IRQ 15	[Unassigned]	Usable IRQ